

# PAVICS

## A Platform for the Analysis and Visualization of Climate Science

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(1) Ouranos, (2) CRIM



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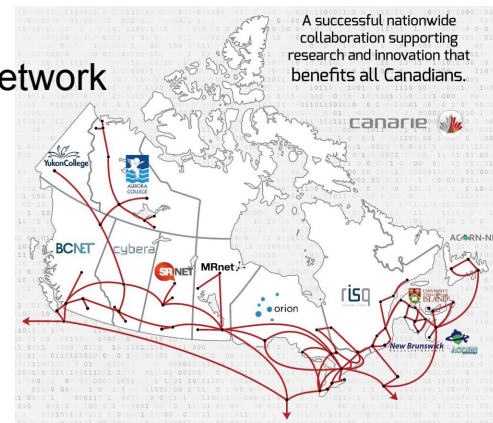
- Consortium on Regional Climatology and Adaptation to Climate Change
- Provides climate scenarios and services
- Runs a regional climate model
- Consulting services on adaptation to climate change



- Computer Research Institute of Montreal
- Applied research center in IT
- Positioned between academia and businesses



- Canada's National Research and Education Network
- Funds digital infrastructure for research
- Funds reusable research software tools



# Ouranos needs a platform for climate services

## Creating and delivering climate products

For each client, create and run a suite of operations converting raw climate data into useful “products”;

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Enforce best practices on staff;

Archive operations and parameters as “workflows” (provenance & reuse);

Share workflows with colleagues;

Improve code quality, reduce errors;

## Make climate research less painful

Replace nitty-gritty details by abstractions;

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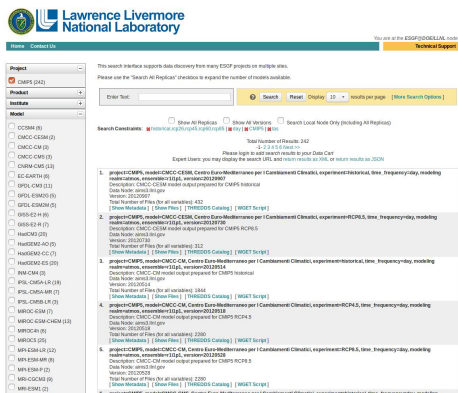
Replace list of files by criteria-defined “ensembles”;

Replace grid masks by “regions”;

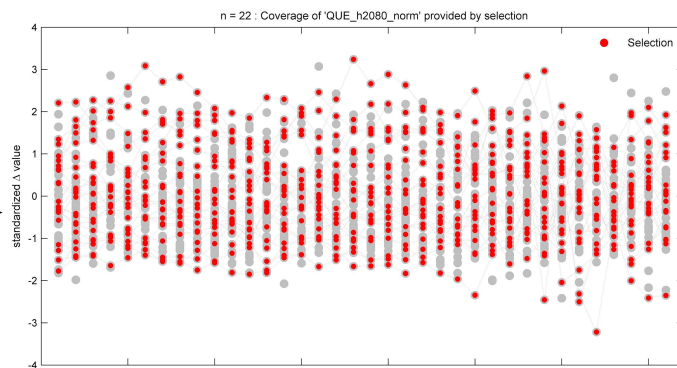
Replace algorithms by “processes”;

Replace cpus by “computing ressources”;

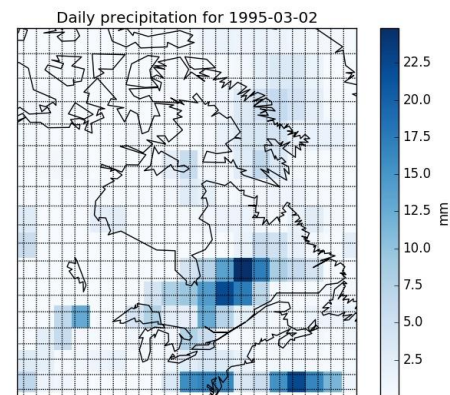
# Data search & acquisition



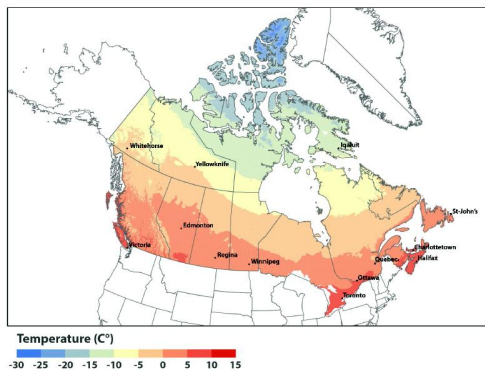
# Selection of an ensemble of simulations



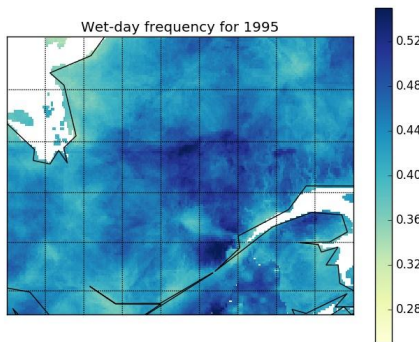
# Subsetting



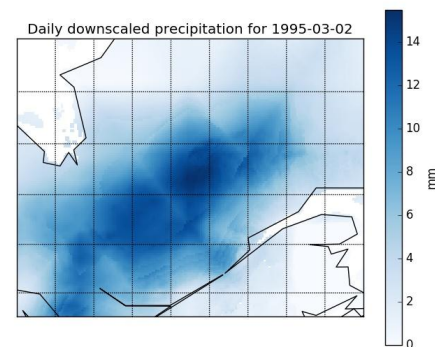
# User specific visualization

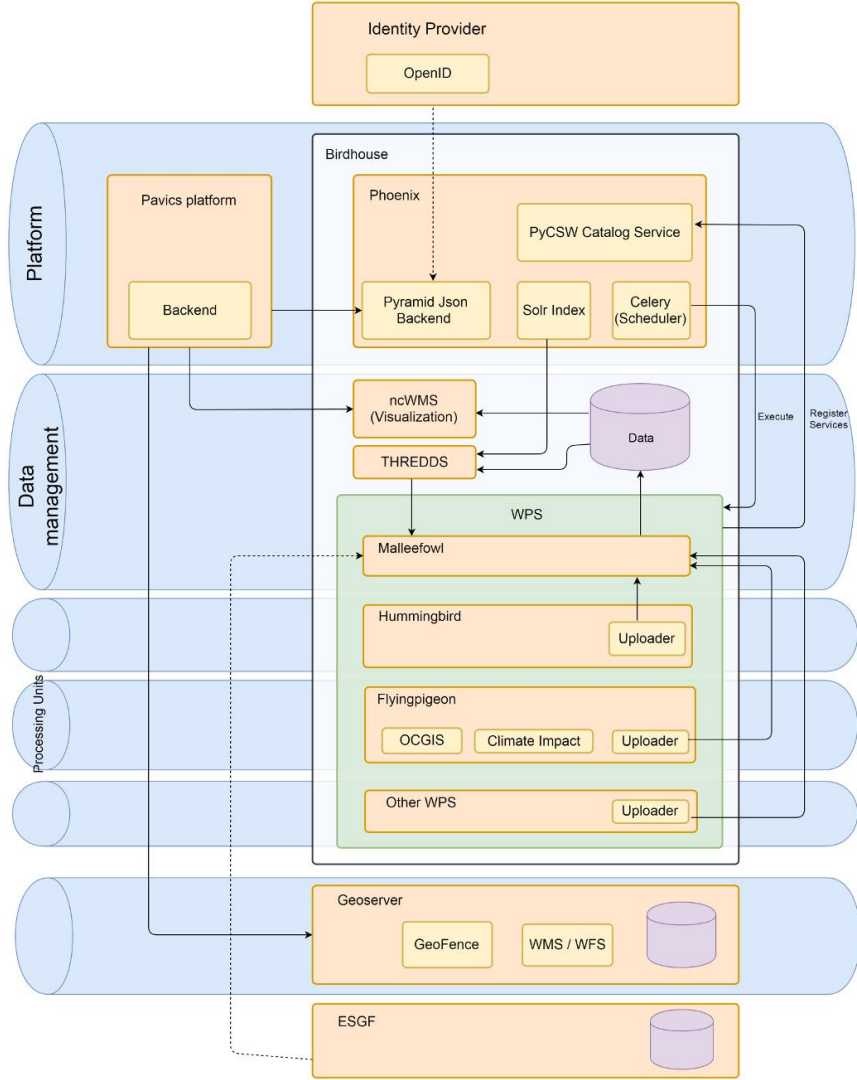


# Climate indicator computation



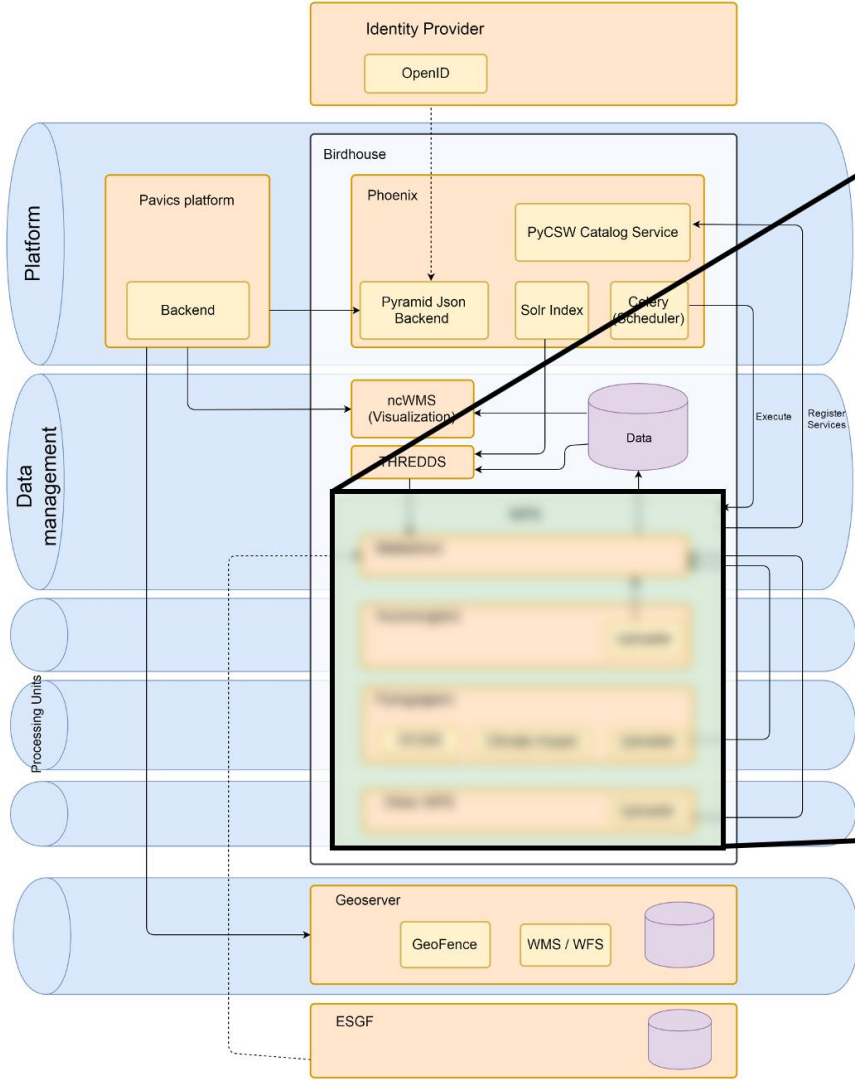
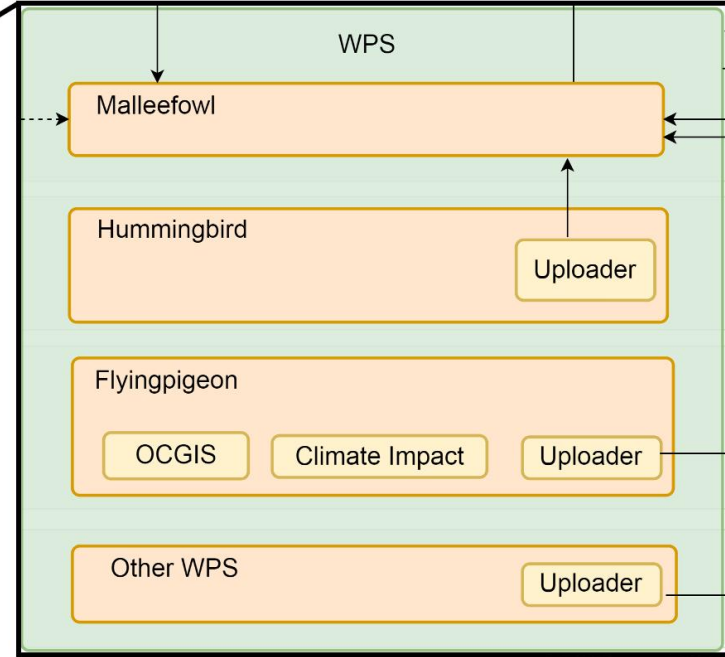
# Downscaling



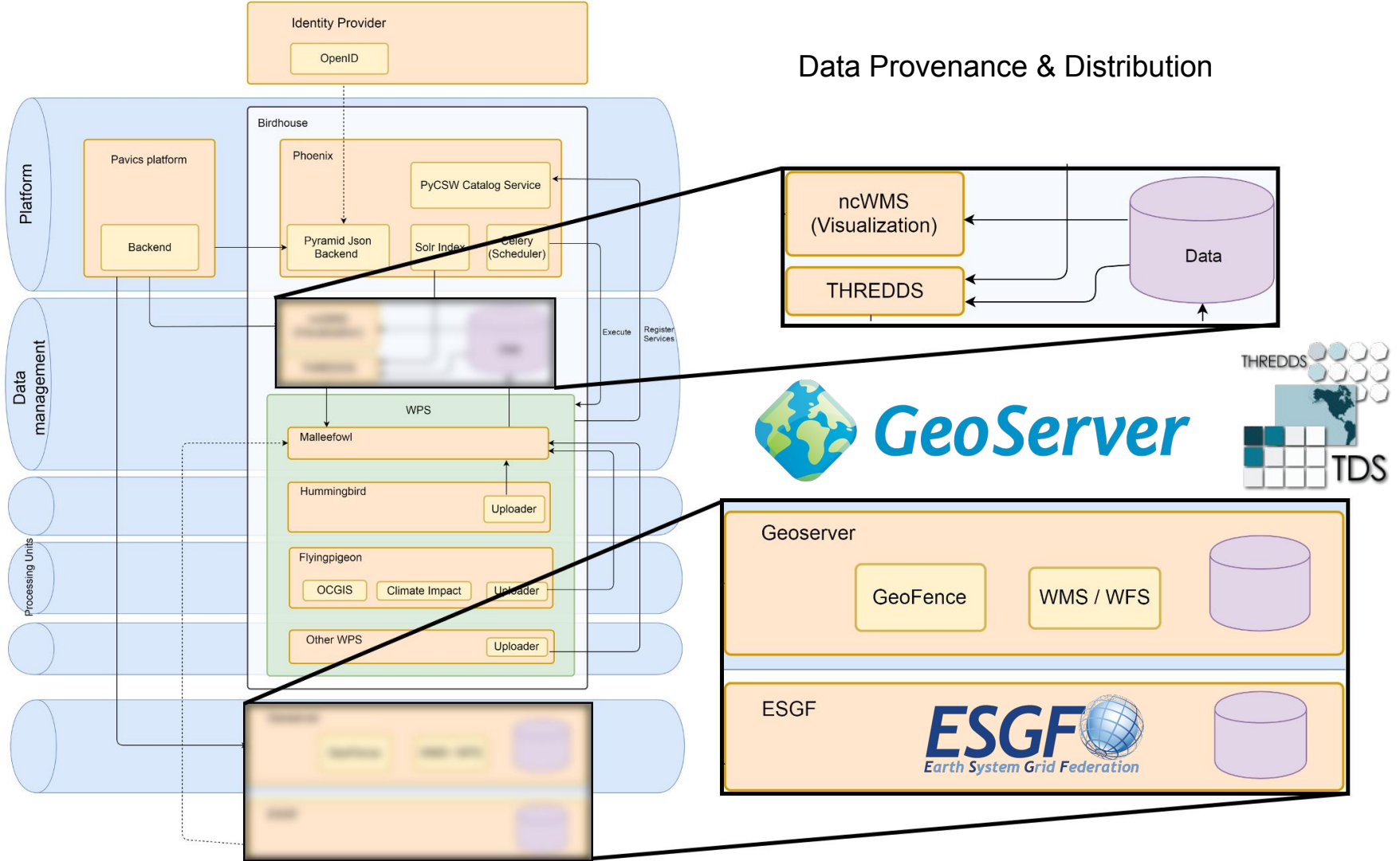


## PAVICS Architecture

## Climate Data Processing with Birdhouse

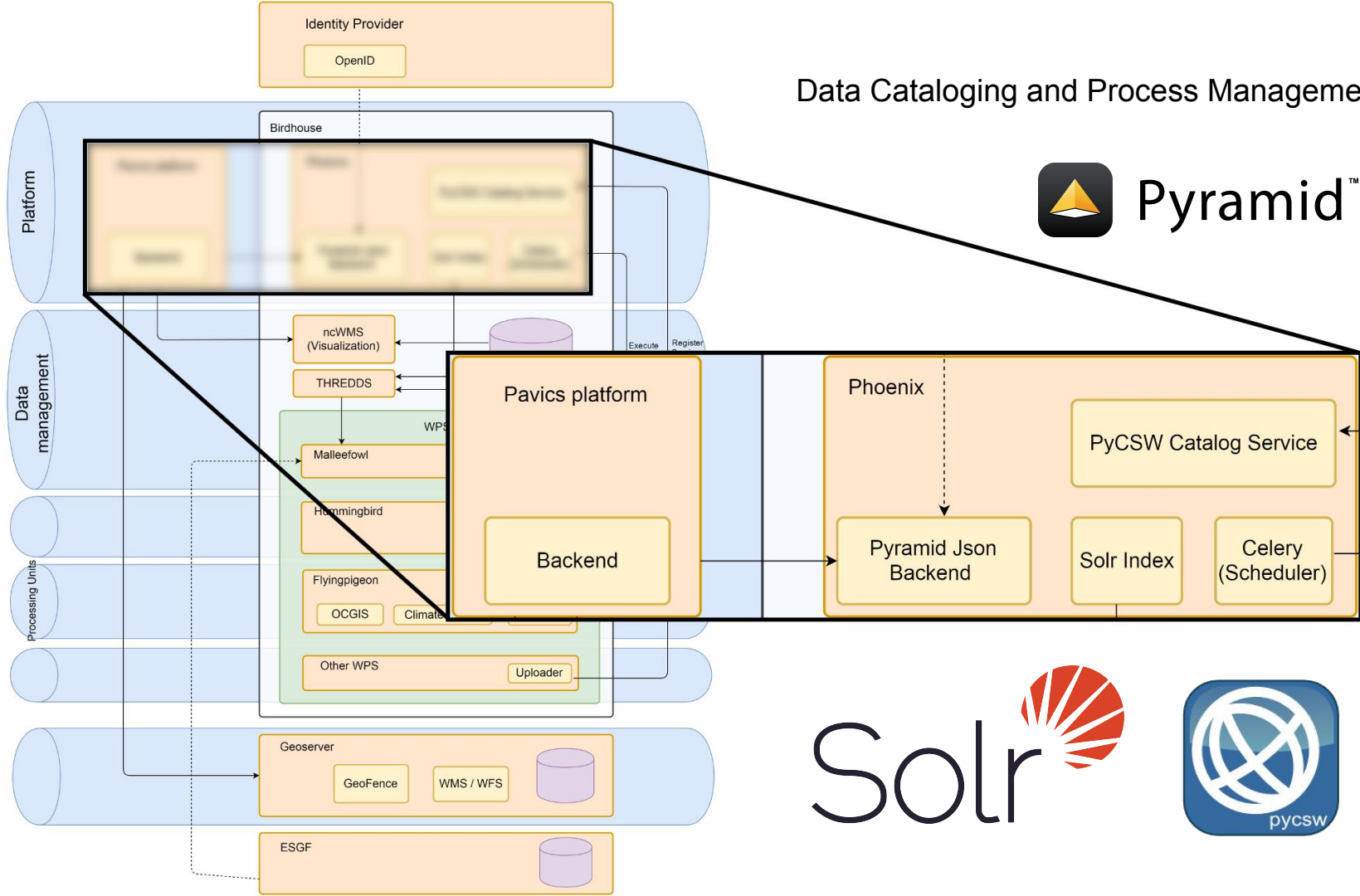


## Data Provenance & Distribution

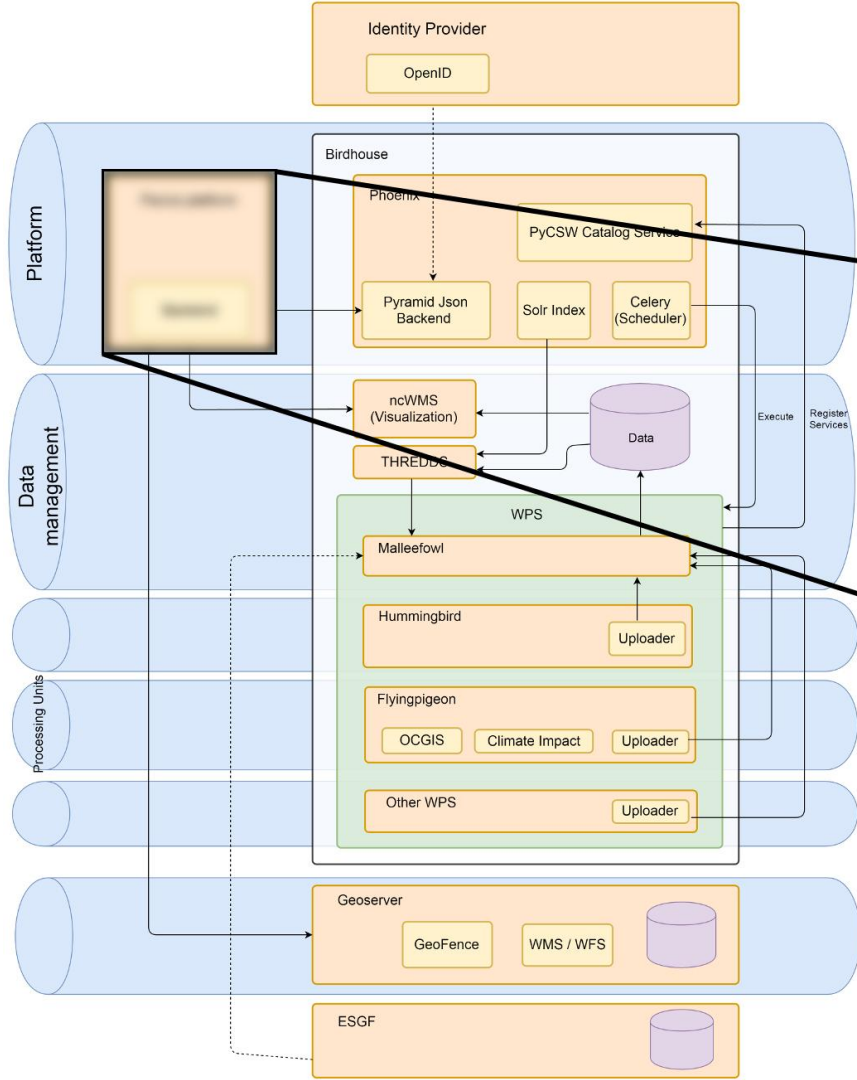




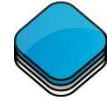
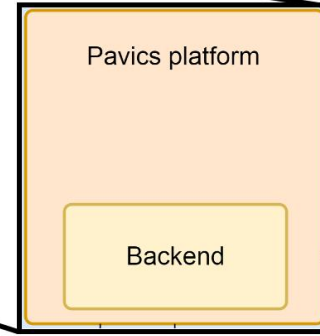
## Data Cataloging and Process Management



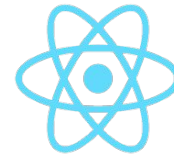




Web platform



OpenLayers 3.0



React



# Internal assessment of UV-CDAT and COG

## UV-CDAT

- Hard time understanding how to extend with new functionality
- Crashes with regional model simulations (early 2016)
- Uncertainty regarding provenance mechanism, web UI

## Cog

- YUI not maintained since 2014
- No REST API
- No client side business logic

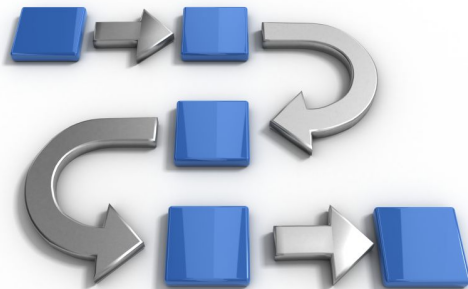
# Exploration of emerging technologies

- Secondary objective of the project: identification and exploration for more advanced topics.
- Deliverable as sandboxes or local test instances.

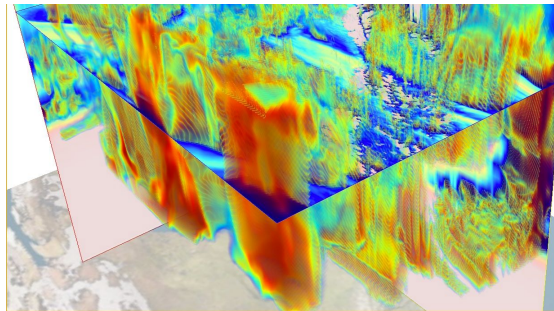
*Big data stack*



*Advanced workflows*



*N-Dimensional visualization*



Source: UV-CDAT

# Outlook

canarie



CRIM



- As a climate service organization, we must **move away from repeating primitive tasks** of scripting data search, subsetting and basic climate indicator computations for each project.
- We must also acknowledge that our members have varying degrees of familiarity with climate science and big data manipulation and therefore **require different climate products**.
- **Modularity** is key to plug and play the components that allow the creation of a user experience tailored to the many categories of climate science users.
- **Dialogue** between the many development teams that are working on the challenges of climate data distribution and analysis stimulates reusability, proper documentation, and more thorough testing.